

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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**University Examinations 2015/2016**

FOURTH YEAR, FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS AND COMPUTER SCIENCE, THIRD YEAR, FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE PHYSICAL, SECOND YEAR, FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE STATISTICS AND SECOND YEA, FIRST SEMESTER EXAMINATION FOR BACHELOR OF ACTUARIAL SCIENCE

**SMA 2306: LINEAR ALGEBRA II**

**DATE: November, 2015 TIME: HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE – (30 MARKS)**

1. Show that A = is a zero of (5 Marks)
2. Let f: be defined by f(x,y) = (x+y, x). Show that F is linear. (4 Marks)
3. Prove that similar matrices have the same determinant. (4 Marks)
4. Find the characteristics polynomial for :

(4 Marks)

e) Compute the minors and the co-factors of each element in column one of the matrix.

A = (4 Marks)

f) Let T: be a linear mapping defined by t (x,y,z) = (2x +y-z, 3x – 2y + 4z). Find matrix T relative to the basis of and of .(5 Marks)

g) Let V be a vector space over F. Prove that for eve (4 Marks)  
**QUESTION TWO (20 MARKS)**

1. Let A = Find a matrix P that diagonalises A. (6 Marks)
2. Find the minimum polynomial of (6 Marks)
3. Find the values of t for which the matrix below is singular

(5 Marks)

1. Prove that similar matrices have the same characteristic polynomial. (3 Marks)

**QUESTION THREE (20 MARKS)**

1. Find the matrix of the linear operator with respect to the usual basis (6 Marks)
2. Find the characteristic polynomial, minimal polynomial and the eigen values of the matrix

A = (8 Marks)

1. Let T: be defined by T(x , y) = (x +y, -2x + 4y). find the determinant of T

(6 Marks)

**QUESTION FOUR (20 MARKS)**

Let A=

1. Find all the eigen values of A (8 Marks)
2. Find a maximum set s of linearly independent eigen vectors of A. (12 Marks)

**QUESTION FIVE (20 MARKS)**

a) Define a vector space with its axioms. (5 Marks)

b) Show that the setV= with the standard vector addition and scalar multiplication defined as

c() is not a vector space. (5 Marks)

1. Find f(A) given that and f(t)= (5 Marks)
2. Let T be a linear mapping defined by T (x,y) = (5x +y, 3x – 2y). Find the matrix T with respect to the basis (5 Marks)